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COMMENTS ON "CANCER MORTALITY RATE"

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In the article "Cancer Mortality Rate" published in the May, 1962 issue of Archives of General Psychiatry, Lawrence LeShan advanced statistical evidence on the effect of psychological factors on the cancer mortality rate. The following comments on that article indicate that the statistical evidence presented does not constitute a satisfactory argument.

LeShan attempted to demonstrate the psychological factors of the cancer mortality rates by correlating the cancer mortality rates with the suicide mortality rates from 1914 to 1953. (The data used were from the Vital Statistics, Special Reports, Vol. 43, No. 11, June 27, 1956, and Vol. 43, No. 30, August 22, 1956. National Office of Vital Statistics, U. S. Public Health Service, U. S. Department of Health, Education, and Welfare.) Many of the correlations he computed were large in absolute value. From this, the conclusion was drawn that both the cancer mortality rate and the suicide mortality rate shared, at least in part, the same cause--namely the psychological state of the individual as influenced by his socioeconomic environment. There are logical flaws in the analysis.

Correlation should not have been applied to these data. Correlations should be computed for samples from a single population. Often, paired observations made over a long period of time are not from a single population. The case in point correlates the variation, over time, of two mortality rates. It is well known that there are long range slow changes in most causes of

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death due to changes in the population and in the medical arts. It is likely that there are also such changes in the suicide rates due to industrialization, urbanization, and reporting methods. These changes have no direct interconnection, but since they occur simultaneously, it is likely there will be statictically significant correlations between the series of rates through time. Even though strong correlations occur, they do not imply any causal relationship.

The statistical analysis LeShan performed was duplicated. Table I shows the values of the correlations computed by LeShan. The values were recomputed by the present author. There are serious discrepancies for many of the age-race-sex specific groups. Nevertheless, there remains no doubt concerning the existence of correlations between the suicide and cancer death rates.

It has already been explained that statistically significant correlations will occur in the data due simply to long range time effects. However, there was a desire to estimate the values of the correlations after removal of the long range time effect. Correlations were computed based on the deviations of the values from a "best line", to correct the data for a long range linear time effect. These corrected correlations appear in Table I. Since the correction is only for a linear time effect it yields unpredictable and erratic results when the time effect present does not approach linearity. The results show a decrease in absolute value of many of the correlations. The time effect present in these groups evidently approaches linearity. Several of the corrected correlations are larger in absolute value as is expected from the presence of non-linear trends in some of the groups.

In this article, I am in no way trying to prove or disprove the presence of psychological factors in the cancer mortality rate. I am only commenting on the errors in computation and the difficulties in the application of correlation methods to time series data.

TABLE I

CORRELATIONS

Population U.S., 1914-1953, suicide and cancer mortality rates.

	from LeShan article	computed from data	corrected for linear time effect
White Male			
15-24	-.54	-.54	-.10
25-34	-.06	-.68	-.26
35-44	-.68	-.62	-.15
45-54	.83	-.49	-.35
55-64	.38	-.46	-.37
65-74	.04	-.16	.59
White Female			
15-24	-.72	-.72	-.11
25-34	.56	-.20	.30
35-44	.68	.67	.49
45-54	.52	.53	.51
55-64	.04	.69	.53
65-74	.32	.44	.34
Nonwhite Male			
15-24	-.20	-.20	.11
25-34	-.41	-.41	.01
35-44	-.82	-.45	.46
45-54	.04	-.20	-.03
55-64	.67	-.09	.21
65-74	-.21	-.26	.43
Nonwhite Female			
15-24	-.57	-.53	-.17
25-34	.24	.14	.27
35-44	-.19	-.29	-.17
45-54	.20	.09	.35
55-64	.62	.02	.19
65-74	-.07	-.15	-.06